

# SCIENCE

FRIDAY, OCTOBER 7, 1887.

ACCORDING TO A Reuter's telegram, dated Sept. 9, from St. Paul de Loanda, Major Barttelot, who was left at the camp at Yambuya, at the foot of the Aruvimi Rapids, with a garrison of about one hundred men, has forwarded the following information to Leopoldville concerning Mr. H. M. Stanley's expedition: "Major Barttelot received news from Mr. Stanley, despatched about July 12, after he had made a ten-days' march from Yambuya towards the interior. Mr. Stanley was at that date still proceeding up the Aruvimi, which he had found to be navigable up to a certain distance above the rapids. Here he launched a steel whale-boat which he had brought with him, as well as several rafts manufactured by the expedition, and which had been utilized for conveying the heavy baggage. All the members of the expedition were in good health, and provisions were easily procured in the large villages near the river. The country through which the expedition was passing showed a gradual rise towards some high table-lands. Another caravan of 480 men was following the expedition on the left bank of the Aruvimi; the advanced guard, consisting of forty Zanzibari, under the command of Lieutenant Stairs, being composed of men lightly burdened, whose duty was to search for provisions. Mr. Stanley hoped to arrive about July 22 in the centre of the Mabodi district, and expected to reach Wadelai in the middle of August, or even before. The advance had been so peaceably accomplished that Mr. Stanley had instructed Major Barttelot, that, should it continue so, he would shortly send him orders to follow the expedition by the same route at the head of the one hundred men left at Yambuya." A later telegram, dated Oct. 2, from St. Paul de Loanda, states that the further progress of the expedition was very satisfactory. About July 25 the expedition had ascended the Aruvimi to the elevated country belonging to the Mabodi district. The river becoming too narrow, they left the rafts; and the men for several days had to carry a double burden of provisions. The steel whale-boat was carried past the narrows, and again launched. Stanley calculated, that, upon arriving at the summit of the table-lands giving shape to the basin of the Aruvimi, the expedition would halt two days for a rest, and would establish a camp there to be garrisoned by twenty men, with a European officer. The districts traversed were tranquil, and little difficulty was experienced in obtaining provisions from the natives. The progress of the expedition averaged twelve miles daily. Tippo-Tip, in his last message, wrote that he was still at his post at Stanley Falls, awaiting re-enforcements. He had gained the good will of several neighboring chiefs. Owing to the disturbed state of the country, Tippo-Tip could not, as he had agreed to, organize a revictualling caravan to despatch direct to Mvutan Nsige, but he intended to do so as soon as possible. Disquiet continued between Stanley Falls and the confluence of the Aruvimi and the Kongo, and many villages had been pillaged. It is believed that the garrison which Stanley left at Yambuya has been forced to interfere to maintain order in the neighborhood. It appears from all reports that Tippo-Tip, since he has become connected with the Kongo Free State, has some difficulty in regaining his former influence over his countrymen. The disquiet on the Upper Kongo, to which reference is made in the second telegram, probably refers to the ravages of the Arabs of Stanley Falls, who extend their slave-hunting expeditions down the Kongo. It is to be hoped that Tippo-Tip's influence, supported by Major Barttelot's troops, which are stationed near the mouth of the Aruvimi, will suffice to confine their raids to the territory above Stanley Falls.

It is in accordance with Emin Pacha's former actions that he declares at the present time his intention to stay in his province, and to further the work of civilization he has so successfully begun. It appears from the meagre news that has reached America, that the messengers who were despatched to inform him of Stanley's expedition have met him, and that this is his reply to the message. Emin expresses the hope that England will help him to open a route of commerce to the Indian Ocean, but it seems more probable that communication with the Kongo will be opened by Stanley's expedition. Junker's travels show that there is no serious obstacle to travel in the region of the northern tributaries of the Kongo; and therefore it seems probable, that, while political complications close the routes of the Nile and of Uganda, Emin and Stanley may succeed in opening trading-routes from the Upper Kongo to the Equatorial Province.

IF THE PRESIDENTS of all our colleges would follow the example of President Barnard of Columbia, and publish each year a full report on the progress of the institutions over which they respectively preside, it would be an advantage not only to the institutions themselves, but to the cause of higher education in general. Mr. Charles F. Thwing, always an observant critic of college methods, emphasizes this point in a recently published article. President Barnard's report for the last academic year has just been issued, and, with its appendices, is a most valuable document. It rehearses the changes and improvements of the year, traces the work of the various schools separately, and discusses such questions as those of attendance, scholarship, the marking system, elective studies, and the wonderfully successful public lecture courses of the past two winters. We are glad to notice the steady growth of the graduate department, as it augurs well for the future of the institution. President Barnard says very little concerning the finances of the college, and we are therefore led to infer that no appreciable part of the sum asked for three years ago has been obtained. An announcement reaches us with the president's report, which should be referred to in this connection. It is the programme of courses in the Oriental and Hamitic languages offered for the present year. From this we learn that the most complete department of its kind in America exists at Columbia, and that, under the inspiring leadership of so cultured a scholar as Dr. H. T. Peck, no fewer than nineteen courses in the Oriental and Hamitic languages are announced. This is a remarkable showing, and when considered in connection with the courses of Professors Bloomfield and Haupt at Baltimore, Whitney at New Haven, and Lyon, Toy, and Lanman at Cambridge, proves that a great impetus has been given to advanced philological study in this country.

## THE HIGHER SCHOOLS OF NORWAY.

THE Norwegian school-laws of the 17th of June, 1869, according to the *Zeitschrift für das Realschulwesen*, xii. 3, recognize three fundamental principles. First, all higher schools must have a lower course in common, so that it will not be necessary at the outset, with the choice of a school, to choose also one's ultimate vocation. Secondly, the length of the course must be so regulated that the pupil, upon its completion, shall be of an age to enter intelligently upon the active duties of his calling; the curriculum must also form in itself a whole, and be so arranged that the pupil who has completed it carries with him into life a good general education. Finally, the time devoted in the upper classes to preparatory studies must be so disposed that the pupil may confine himself more especially either to history-philology, on the one hand, or to mathematics-natural sciences, on the other.

The whole system of higher education in Norway is based upon the intermediate school. It is the preparatory school of the Gymnasium, — the Latin as well as the Real Gymnasium, — and has a six-years' course. The requirements for entrance are essentially the same as in the Prussian *höhere Bürgerschule*. The normal age at entrance is nine years. For the first three years the course is in common: with the fourth year it is divided. The pupil preparing for the Latin Gymnasium receives instruction in Latin seven hours per week, which continues through the remainder of the course. All others have instead the so-called 'Real' course; in the fourth year, English and drawing; in the fifth and sixth years, English, drawing, and an hour more of German. Otherwise the courses are identical. In the fifth and sixth years two hours of French are elective. A certificate of proficiency from the intermediate school is required for admission to a Gymnasium; it also entitles its possessor to enter a technical school, and is required of a dentist. A certificate in the Real course only, admits to the naval academy and to the telegraph service; in the latter case the pupil must also have been proficient in French. The future apothecary must possess the certificate of the Latin course.

The Gymnasium — the Latin Gymnasium as well as the Real Gymnasium — is the preparatory school of the university and of the higher technical schools. It has a three-years' course, arranged as follows: —

#### Latin Gymnasium.

	I.	II.	III.
Normal age at entrance .....	15	16	17
1. Religion .....	1	1	2
2. Norwegian and Old Norwegian .....	3	3	4
3. Latin .....	9	10	9
4. Greek .....	7	7	7
5. French .....	4	2	2
6. German .....	1	—	—
7. History and physical geography .....	3	3	3
8. Mathematics .....	2	3	3
Total number of hours .....	30	29	30

#### Real Gymnasium.

	I.	II.	III.
Normal age at entrance .....	15	16	17
1. Religion .....	1	1	2
2. Norwegian and Old Norwegian .....	3	4	4
3. English .....	4	5	5
4. French .....	4	2	2
5. German .....	1	1	—
6. History .....	3	3	3
7. Physical geography .....	1	1	2
8. Natural sciences .....	6	5	4
9. Mathematics .....	5	6	6
10. Drawing .....	2	2	2
Total number of hours .....	30	30	30

The certificate of proficiency from the Latin Gymnasium entitles its possessor to enter upon any course of study. If, however, the pupil desires to enter the military academy, he must pass an examination in mathematics, the natural sciences, and drawing, the requirements in these branches being the same as at the final examination of the Real Gymnasium.

The certificate of the Real Gymnasium entitles its possessor to enter the advanced technical courses, to pursue the study of jurisprudence, and admits to the military academy. If a graduate of the Real Gymnasium desires to study medicine, he must pass an oral examination

in Latin; the requirement, however, being the same as at the final examination of the intermediate school, not of the Real Gymnasium. The candidate must show that he has read three books of 'Cæsar's Commentaries,' twenty-four chapters of 'Cicero's Orations,' and five hundred verses of 'Phædrus.' In addition, there is a short written translation from Norwegian into Latin, in which the use of a dictionary is permitted. Most of the graduates of the Real Gymnasium who are to study jurisprudence also take this examination; on the one hand, because Roman law is an important factor in the State examination, and because those who have passed this examination have especial prerogatives in the *examen philosophicum* which precedes the state examination. In order to study theology and philology, the graduate of the Real Gymnasium must pass an oral examination in Latin and Greek, the requirements being the same as at the final examination of the Latin Gymnasium.

The system of preparatory instruction here described has existed in Norway now for some twenty years, so that it is possible to judge, to some extent, of its efficiency. Statistics show that the great majority of those who discontinue their studies after the completion of the course of the intermediate school take the Real course. Of those who take a higher course in the university and the technical schools, two thirds have been graduated from the Latin Gymnasium, one third from the Real Gymnasium. This result, however, is to be explained by the fact that the transformation of the former Latin schools into Latin Gymnasiums necessitated comparatively few changes. Where circumstances, accordingly, allowed but one higher school, the Latin Gymnasium was chosen, which offers, besides, certain tangible, if not materially important prerogatives. Real Gymnasiums and Latin Gymnasiums exist side by side only in the larger cities, the number of which in Norway is very small. Eight cities have both a Real and a Latin Gymnasium, and twelve a Latin Gymnasium alone.

W. H. C.

#### ACCLIMATIZATION IN NEW ZEALAND.

IN a former article (*Science*, viii. No. 197) reference was made to the various species of animals which had been purposely introduced into these islands. In all cases it is difficult to foretell what effect will be produced upon any species by bringing about a change in its environment, and this truth has been well exemplified in the case of many animals, now, alas! too well established in the colony. Unfortunately the age of experiments in this direction has only begun. Rabbits, having no natural enemies to keep them in check, have become such a pest and source of loss to the colony, that the latest move — taken up both by interested sheep-farmers and by the government — has been to liberate sloats, ferrets, and weasels in many parts. Slowly as these animals increase, they have already made their presence felt; not, however, in the diminution of the rabbit-pest, but by their destruction of hen-roosts, and attacks upon children. Following in the wake of settlement, but not introduced purposely by man, are many other species, mostly small and noxious. When settlers first penetrate into the untrodden parts, especially of the South Island, they are attacked by hordes of blood-thirsty sandflies and mosquitoes; while the greatest care has to be taken to ward off an abundant blowfly, which lays its eggs, or ready-hatched maggots, upon every thing exposed. Blankets, flour-bags, and clothing are just as readily 'blown' as meat or offal. But as cultivation proceeds, and the ground is cleared, these insects disappear, while common European blue and house flies take their place. The latter, like the human being they follow after, even bring their diseases with them; so that every autumn their distended bodies are found attached to window-panes by the mycelium of *Empusa musca*.

As settlement progresses, and new trees and plants begin to take the place of the old vegetation, the familiar pests of the mother-country begin to appear. *Aphides*, *Coccidæ*, various beetles, moths, and flies, together with parasites which infest man and beast, become all too familiar. In many cases it would seem at first as if these were going to have it all their own way. Some twenty years ago it was considered nearly impossible to grow Swede turnips in this part of the colony, so enormously abundant was the *Aphis* upon them; but within these two decades a small bird almost certainly of recent introduction from Australia, called green-eye, wax-eye, or blight bird (*Zosterops lateralis*), has increased

very much, and coincidently with this has been such a decrease in the *Aphis*, that it has practically ceased to be a pest.

But the most conspicuous effects of man's influence is the introduction of numbers of species of plants which find themselves more or less at home in this new land. It is matter of common remark to every person coming to the colony, how English every thing looks. The wayside weeds, the grass with its daisies and ox-eyes, the fields and gardens with European chickweed, docks, and thistles, — all remind him of the old land. English plants chiefly have spread themselves over the country, wherever the settler has gone. One might expect that Australia, or America, being so much nearer, would have furnished the greatest proportion of immigrants; but this is not found to be the case. It is what Sir Joseph Hooker has called the aggressive Scandinavian flora, which so strongly asserts itself on all sides. The reasons of this are perhaps not far to seek. Nearly all the seeds brought to the colony in the earlier days of settlement came from Britain. English grasses were brought and sown down, and along with them came the weeds of English pastures. Compressed hay was brought frequently with imported stock; straw-packed goods were, and are, scattered throughout the country; and thus, in one way and another, it is the European species of weeds which have found their way here in the greatest abundance. The conditions of acclimatization are very dissimilar in different parts of the colony, extending as it does through twelve degrees of latitude, and thus embracing very different climates. The southern parts of the South Island are as different from the Bay of Islands as Scotland is from Italy. Throughout the greater part of the east side of the South Island, night frosts are experienced during the winter, even along the coast; while inland the cold is much more intense and continued, the summer being at the same time hotter. But in all other parts, frost, at ordinary levels, is the exception, while in no portion of the country are the droughts prolonged, as in Australia.

One of the results of such a distribution of climate is, that fewer introduced plants have succeeded in acquiring a foothold in the southern and colder parts than elsewhere in New Zealand; and as we go farther north we find the number of acclimatized species becoming more and more abundant. While those of Otago are chiefly such as are to be met with in England and Scotland, those of the north of Auckland are largely mixed with mid-European plants, and many of tropical and sub-tropical distribution. This is well seen by comparing the appearance at different ports. On landing in the Bay of Islands, one sees large patches of *Agave Americana* marking the sites of old gardens, but spreading far and wide, as if quite at home. The ground is carpeted with the familiar 'doab-grass,' as it is called in Bengal (*Cynodon dactylon*). Lily-of-the-Nile (*Richardia*) blocks the water-courses, while other tropical forms (*Amarantus*, *Aponogeton*, *Lycium*, etc.) occur freely as wild plants, intermingled with others of much more temperate habitat. Pursuing his journeys south, the traveller enters Napier, and, passing from the landing-place to the town through a ravine-like cutting, finds scarlet geraniums and forests of fennel competing with mesembryanthemum and introduced fuchsias for possession of every bit of soil. He infers at once a climate quite free from frost. But now let him land at Dunedin, and none but old country friends meet him. Shepherd's purse, groundsel, and docks occupy the wayside with similar equally familiar weeds. The meadows and pastures are white with daisies and ox-eyes (*Chrysanthemum leucanthemum*), or yellow with cat's-ear (*Hypochaeris radicata*), buttercups, and self-heal (*Prunella*), and, with a slight effort of imagination, he might almost fancy that he was back in 'bonny Scotland.' The tropical element is here wanting. While nearly four hundred (387) species have been recorded as occurring in the Auckland district, not more than 160 are known from Otago in the south.

It is a much-disputed question among local botanists, whether the native flora can hold its own against the introduced plants, or not. When we consider that species brought from old (from a human point of view) and long populated countries, in more or less close proximity to one another, have acquired their present characteristics after long ages of a keen struggle for existence with one another, and with herbivorous animals to fight against, we should certainly expect them to prove extraordinarily aggressive in such a

country as this. Here the animals are wanting, the climate is milder, moisture is abundant, and all the field seems to lie open. Accordingly, wherever the settler goes with the axe and plough, and, above all, with fire, the introduced plant follows him, and thrives. But it is now pretty well ascertained that if man stays his hand, the native vegetation does not continue to recede before the alien: on the contrary, it seems once more to tend to re-assert itself. That, at least, is the testimony of our two most competent botanists, Mr. Cheeseman in Auckland, and Mr. Kirk in Wellington, as well as of the writer in Otago.

The way that some plants have spread is most remarkable. The common thistle (*Carduus lanceolatus*) has gone over the country like smoke, especially following fire and cultivation. When first established, it forms thickets which frequently are impermeable; but this state never lasts long. The soil appears to refuse, at the end of two or three years, to yield up its former abundance, and the plant exhausts itself. This process in many parts is absolutely beneficial to the soil. In the limestone districts to the north of Otago, the writer has seen vast areas, which had been once ploughed, covered with an impenetrable forest of thistles six feet or more in height. In autumn the whole crop dies down, leaving the rocky soil penetrated in all directions by its long roots. As these decay, water finds its way down to the lower levels; and on ploughing the soil, and sowing a crop of winter wheat, the farmer is rewarded by a sixty-bushel crop.

Two or three species truly indigenous are now abundantly represented by the introduced European form. This is certainly the case with the dandelion (*Taraxacum*) and sowthistle (*Sonchus*), and most probably also with the smooth geranium (*G. molle*). The native form is all but extinct, the introduced being abundant.

In some cases characters are developed which appear to tend towards the formation of new varieties. Thus *Bartsia uiscosa*, always considered a root-parasite in Europe, is truly established on its own roots in this country. Water-cress, which grows to a length of from two to four feet in its native habitats, attains gigantic proportions in many New Zealand streams. In the Avon at Christchurch it is frequently found with stems as thick as a man's wrist, and twenty feet in length. Sheep's-sorrel (*Rumex acetosella*) is here an unmitigated garden and field pest, especially in poor soils, where its tough underground stems will creep as much as a yard in a season, if the soil be kept well stirred. Equally remarkable is the changed character of *Poa pratensis*, so famed as a pasture-grass in the States. In New Zealand it gives a poor return as a permanent pasture-grass, while in arable land it is a curse, matting the surface soil into an unworkable mass. No doubt one cause of the troublesome nature of many of the common garden-weeds is the comparative absence of frost. Many plants which are strictly annuals in Europe or America, become biennial or perennial here. Chickweeds (*Stellaria* and *Cerastium*) and groundsel flower all the year round.

One of the most aggressive species in the country is the white or Dutch clover (*Trifolium repens*), which has shown great power of spreading, both laterally and vertically. Introduced plants are often met with also in most unexpected localities. The writer, when rambling along the slopes of Mount Torlesse, in the Canterbury Alps, was surprised to find some of the valleys — miles away from human habitation — full of a common mullein (*Verbascum thapsus*); but such instances are rare. The botanist rather wonders, that, considering how greatly specialized to their surroundings New Zealand plants are, they do not more quickly succumb to the intruders.

Finally, an interesting question, puzzling to the acclimatizer, is the difficulty of introducing certain — to him — desirable plants. Primroses and cowslips, foxgloves, and many other sylvan and meadow beauties, will not run wild. They die out if removed from the garden. The cause seems to lie in the absence of the insects necessary for their fertilization.

Both in the case of plants and animals, then, an interesting field for future observation exists in this country; and fortunately, accurate information on the whole subject has been accumulating from the very outset, so that the future naturalist has no 'dark ages' to look back to, but will always have some trustworthy record to refer to.

GEO. M. THOMSON.

Dunedin, Aug. 11.

## MENTAL SCIENCE.

## Brain-Growth and Body-Growth.

THE late Dr. Parrot of France was, at the time of his death, collecting anatomical material for a study of the progressive development of the several parts of the body as measured by such characteristics as size and weight. Some of this material has been arranged by Mlle. Jeanne Bertillon, and presented by her to the Anthropological Society of France. The problem there discussed is the ratio of increase in weight of the brain to the increase in weight of the body as a whole, of the height, of the heart, and of the spleen. This is ascertained for the two sexes and for the various ages, especially for the first years of life, when growth is at its maximum. As will be seen, the results given are founded on a sufficiently large number of measurements to make them generally reliable.

Expressing the weight of the body, of the heart, of the brain, of the spleen, and the height, as 1,000 at birth, their condition at several periods up to the sixth year is given in the following table:—

Age.	Weight of Body.		Weight of Heart.		Weight of Brain.		Weight of Spleen.		Height.	
	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.
0 to 1 month . . . . .	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
1 month to 3 months . . .	1,190	1,124	1,179	1,135	1,246	1,348	1,280	1,286	1,066	1,036
3 months to 6 months . . .	1,596	1,486	1,487	1,499	1,666	1,579	1,852	1,860	1,202	1,128
6 months to 1 year . . . . .	2,257	2,150	2,280	2,191	2,170	2,137	2,321	2,153	1,356	1,315
1 year to 2 years . . . . .	3,200	2,921	3,189	3,095	2,756	2,647	3,230	3,390	1,540	1,513
2 years to 4 years . . . . .	4,341	4,229	4,022	3,849	3,210	3,202	4,570	4,210	1,744	1,683
4 years to 6 years . . . . .	5,367	5,480	5,167	5,160	3,435	3,461	5,330	5,560	1,971	1,960

Thus it appears that at the end of this period the height has about doubled, the brain a little more than tripled in weight, and the weight of the body, as of the heart and spleen, more than quintupled. In another table is considered how much of this growth of the first five years has been contributed by each of the several periods of age above specified. From such a comparison, it appears that the brain develops sooner and more rapidly in early life than even the height. The percentage of the growth of the first five years, that takes place in the first six months, is, for the body-weight, only 13.66 for females, and 10.82 for males; for the heart, 11.43 and 11.88; for the spleen, 19.7 and 19.0; for the height, 20.8 and 11.40; while for the brain it is as much as 27.41 and 23.51; the first figure referring to the females, and the second to the males. The same fact is more clearly brought out by saying that at the beginning of the second year the female brain has already increased by 72 per cent of all the increase it will have made within the first five years, while the body-weight has not reached 50 per cent of the development it will have at the sixth year. Expressing the total progress at the opening of the second year in terms of the total progress at the opening of the sixth year, the following table shows in detail the relative amount of growth attained by the several parts:—

	Body-Weight.	Weight of Heart.	Weight of Spleen.	Height.	Weight of Brain.
Female . . . . .	50.36	52.54	51.50	55.53	72.33
Male . . . . .	42.86	50.46	52.50	45.70	66.85

The striking fact here is the advance of the female above the male. This, it has been suggested, is what one ought to expect, on the theory that the female organization is nearer the primitive type than the male, for savages (and animals) are marked by a more rapid march to maturity than civilized man. In actual weight and height, however, the male, as is well known, exceeds the female;

and on the average during the first five years, taking the female weight (and height) at 1,000, the male weight (and height) is shown below. It may be noted that the brain-ratio between the two sexes is larger than that of any other part.

Body.	Heart.	Brain.	Spleen.	Height.
1,073	1,077	1,096	1,087	1,030

Greater changes take place within the first three months than within the period from the third to the sixth month, but the maximum of growth takes place in the latter half of the first year.

The sexual differences in these respects are very marked throughout. The disparity diminishes within the first four years, to reappear in from the fourth to the sixth year with the same intensity as in the first months of life.

With which of the four measurements does the growth of the brain in weight keep the most constant ratio? Omitting the weight of the spleen as unimportant and variable by pathological and other causes, a glance at the following table will show that the body-weight and the height give no such constant ratio.

Age.	1,000 Grams of Body to 1 Gram of Brain.		100 Centimetres of Height to 1 Gram of Brain.	
	Number of Cases.	Ratio.	Number of Cases.	Ratio.
0 to 1 month . . . . .	196	166.6	94	726.5
1 month to 3 months . . .	88	186.9	46	865.7
3 months to 6 months . . .	104	175.8	56	1,006.0
6 months to 1 year . . . . .	120	163.1	60	1,220.0
1 year to 2 years . . . . .	202	147.4	142	1,174.0
2 years to 3 years . . . . .	115	128.7	95	1,371.0
3 years to 4 years . . . . .	60	118.1	48	1,531.0
4 years to 5 years . . . . .	44	92.8	34	1,279.0
5 years to 6 years . . . . .	22	101.8	22	1,205.0
6 years to 7 years . . . . .	17	100.6	13	1,264.0

If, however, we compare the weight of the brain with that of the heart, a more constant ratio is found, which Dr. Parrot would dignify with the name of the 'encephalo-cardiac' index to take rank with other anthropological indices. The constant decrease of this ratio with age is thus shown, taking 10 grams of heart to 1 gram of brain.

Age.	0 to 1 m.	1 m. to 3 m.	3 m. to 6 m.	6 m. to 1 yr.	1 yr. to 2 yrs.	2 yrs. to 3 yrs.	3 yrs. to 4 yrs.	4 yrs. to 5 yrs.	5 yrs. to 6 yrs.	6 yrs. to 7 yrs.
Ratio . . . . .	230	257	257	235	216	192	173	158	151	151
No. of cases . . . . .	185	90	90	114	206	117	71	39	22	19

It is probable that after the sixth year the ratio would tend to remain constant. Be this as it may, Dr. Parrot has pointed out an interesting line of research, and one calculated to shed much light on the normal development of children.

THE SAVAGERY OF BOYHOOD.—Mr. John Johnston, in an article in the October issue of the *Popular Science Monthly*, brings home the forcibleness of the analogy between the traits of savages and that of developing civilized mankind. He cites a case of wanton cruelty recorded, by a boy without any apparent feeling for the cruelty of the act. Mr. Johnston, opposing the sentiment that pervades much of the literature that is supposed to be written for boys, does not predict for this boy a life of sin, but gravely contemplates the trait as a step in the normal development of youth. Pity is a late factor in moral evolution, and

a really 'good' boy is morally precocious or diseased. This view does not lower one's estimate of a boy's virtues, but accents those that are suited to his years, as well as the importance of the gradual and timely appearance of the several instincts and emotions without which civilization would be impossible.

#### HEALTH MATTERS.

##### Chest-Expansion and Consumption.

IN *Science*, ix. No. 221, we gave a *résumé* of the views held by G. W. Hambleton, licentiate of the King's and Queen's College of Physicians, Ireland, on the origin and prevention of consumption. These views were presented last year at a meeting of the British Association for the Advancement of Science. Since then Mr. Hambleton has been engaged in certain experiments upon this important subject, and during this research his attention has been drawn to the fact that the size and shape of the human chest vary according as he varied its conditions. So constant was this variation as to make him doubt the present accepted theory of the inheritance of chest-types.

Taking a well-marked example of the so-called inherited consumptive chest, he subjected it to conditions that tend to develop the lungs, till it corresponded in size and shape, first with the town artisan, then with that of a man of the privileged class, and finally with that of a man of the best class of insurable lives in America. By subjecting the same chest to conditions that tend to reduce the breathing capacity, he brought it back through the same types to nearly that with which he commenced; and he claims to have produced similar results in other chests within a period measured by months. At birth the average male child of all classes has the same type of chest, but at maturity he has that of the class to which he belongs. The types of chest, Mr. Hambleton claims, vary with the conditions to which these types are subjected. Thus we have the type of chest of those who use wind-instruments, and another type of those who compress their chests in their work or by a corset. In these no one raised the question of inheritance. This variation of the chest is not peculiar to it: it is true of all other parts of the body. The shape of the head may be altered by direct pressure, and the shape and size of the feet in the same way.

According to this theory of Mr. Hambleton, the type of man after birth is solely produced by the conditions to which he is subject: hence the formation of race by man's continuance under the same conditions, and its subsequent divisions into sub-races and families by his migrations into new conditions and the minor differences therein. The field which is opened up for investigation by these views is, as Mr. Hambleton states, a wide and important one. When we have ascertained what the conditions are that produce these differences in man that together make a class or type, we shall be able to produce that class or type; and we shall also be able to tell what type of body is best suited for a given occupation, and for residence in a given country. "Then we shall train men so that we shall no longer send them into occupations with types of body unfitted for the conditions of that occupation, and consequently we shall be spared the misery and loss of those numerous breakdowns from unsuitability of type that are now daily brought before us."

These views have been referred to a committee of the association, with instructions to investigate them; and in a letter which we have received from Mr. Hambleton, he requests that they be thoroughly tested by scientific men in this country. It will, we are sure, be apparent to our readers, that, if all that is claimed for these opinions is true, a most important and valuable contribution to human knowledge has been made; and, if the practical results which are stated to have been obtained in isolated instances can be made general, the improvement in the human race which is certain to follow will be beyond all computation. We shall be glad to open our columns to those who desire to discuss the question, or have any facts bearing upon it.

FOODS CONSUMED IN WINTER. — In no particular does the difference between the customs of the people of the present day and those of their forefathers show itself more distinctly than in the amount and character of the food which they consume during the winter months. The diet of fifty years ago was characterized by

simplicity, and want of variety: that of to-day is just the opposite. This is largely due to the improvements in the processes of food-preserving, by which every form of plant and animal life is as available at one season of the year as at another. Some of these processes are so simple that there is no reason for substituting questionable methods for them, while others require so much time and attention that packers are constantly on the alert to discover a way to shorten the time and lessen the necessary watchfulness. With this object in view, chemistry is often appealed to, to solve the problems which are constantly presenting themselves. It is in this way that chemical products of various kinds find their way into the food-supply. The improvement which takes place in coffee when it is transported in sailing-ships is, now that a quicker method of transportation is employed, counterfeited by polishing and coloring; and to avoid the trouble of long treatment by heat of some vegetables and fruits, and their consequent deterioration in appearance, preservatives of various kinds are employed. One of the most commonly used of these is salicylic acid. The effect of this acid upon health has been thoroughly investigated in France, and its use in foods and drinks has been prohibited in that country since 1881. Prof. E. H. Bartley, of the Long Island College Hospital, Brooklyn, has recently examined this question with great care, and in an article which appears in the *American Analyst* his views and those of other authorities are given in full. In the use of this acid in the treatment of rheumatism, clinical observation shows that it cannot be continued for a long period of time without impairing digestion, and in its elimination it passes out undecomposed through the kidneys. It has been recognized that under these circumstances it not only irritates but inflames these organs. In preserved food we have to do with smaller quantities of the acid, as a rule; though that this is not always the case is shown by Professor Bartley's figures. He says, "The quantity of salicylic acid usually employed in wines is from six to eight grains per gallon, and in beer from twelve to fifteen grains per gallon; or, in the case of beer, from one to one and a half grains to the glass. As many men habitually drink twenty-five glasses during the day, they take from twenty-five to thirty-seven grains of the acid per day. The medicinal dose is usually stated to be from ten to twenty grains." He also calls attention to the fact that nursing mothers are frequently recommended to drink ale, porter, or beer, with the idea that it stimulates the mammary gland, and to the additional fact that temporary renal disease is frequent during the first weeks of lactation. In conclusion, Professor Bartley says, "I should state that another serious objection to the use of salicylic acid is the fact that many samples found in the market contain more or less carbolic acid. It is now almost entirely manufactured from this very poisonous substance, and, unless great care is exercised, an appreciable amount of it is left in the finished product. Indeed, some writers think that some of the fatal accidents recorded from the use of salicylic acid have been due to the presence in it of carbolic acid. If the use of this acid is to be countenanced, impure articles will be used, and greater damage may be done than could come from the pure article. From a careful consideration of the whole subject, I am compelled to regard the use of salicylic acid in foods and drinks, and especially in lager beer, as at least open to serious objections. If it be harmless to healthy adults, the evidence of its deleterious action upon the aged and certain other classes of the community is too strong to be disregarded by sanitary authorities, and should prohibit its use for this purpose."

#### ETHNOLOGY.

##### Dwarfish Races.

A. DE QUATREFAGES has recently published an historical review of the ancient and modern reports on dwarfish tribes. While formerly the descriptions of ancient geographers were considered not trustworthy, many of them have been confirmed by recent explorations. Among these are the tales on the pygmies. Aristotle and Pliny state that a dwarfish people lived near the swamps of the upper part of the Nile. De Quatrefages considers this tribe identical with Schweinfurth's Akka, who at the present time live a little farther south. Pomponius Mela mentions dwarfs who inhabited the neighborhood of the Red Sea. This report was confirmed by

Léon des Avancher's discovery of the dwarfish Wa Berikomo, who are said to be only four and one-half feet high, and by D'Abbadie's visit to the Maze-Mollea, who live a little farther to the north.

Herodotus tells of a dwarfish black people on the banks of the Niger. His description of the land still holds good; but, instead of negroes, Berbers and Tuareg inhabit those regions. At the present time the most northern place in West Africa which is inhabited by dwarfs is Tenda-Maje, where they were met with by Mollien in 1818.

Pliny mentions, besides the dwarfs on the sources of the Nile, others living in what is now south-eastern Belutchistan, where the Brahui, a people of Dravida lineage, are found. Ktesias speaks of pygmies who inhabited Central India. Mr. Rousselet found in that region the dwarfish Bandra-Lok, who live in the Vindhias Mountains.

De Quatrefages considers all Asiatic dwarfish tribes as one group, which he calls Negrito, while the African ones are called Negrillo. His researches lead him to the conclusion that the traces of this race are found from India to the eastern extremity of New Guinea, and from Ceylon throughout India, Farther India, the Philippines, to Japan. In most regions they are mixed with other races. He considers the Dravida one of the most characteristic results of this mixture. It is only on the Andaman Islands and a few other isolated points that the pure race is still in existence. The author shows that individuals of Negrito type occur among the Pariahs of India, and that isolated communities in many parts of south-eastern Asia have retained the anthropological character of this dwarfish race.

De Quatrefages considers the Negrito of all these widely separated regions one race, which originated in southern Asia. When the yellow race migrated southward and the white race eastward, they were compelled to take refuge on the islands, and to migrate to more southerly countries. Thus they populated the Eastern Archipelago, and crossed to Africa.

COELHO ON ROMANIC DIALECTS. — A recent number of the *Boletim da Sociedade de Geographia de Lisboa* contains a third article by Adolpho Coelho on Romanic dialects of Africa, Asia, and America. The principal object of these researches is a study of the development of languages by isolation and admixture of foreign elements, and much new and interesting material has been collected by the author. There is a wide field for researches of this kind in North America. Coelho gives some examples of the French of Louisiana, and a brief bibliography of jargons based on English and other Teutonic tongues, many of which are spoken on our continent. The study of these would be an important goal for an American dialect society, the organization of which was lately proposed.

METLAKAHTLA. — The *American Magazine* for July contains a paper by Z. L. White on Metlakahtla, the famous missionary station on the north-west coast of America, which contains some interesting information on the Indians of that mission. The same subject is treated in the recently published book, 'The Story of Metlakahtla,' by S. Wellcome. Though the purpose of both publications is to extol the work of Mr. A. Duncan, the missionary of the village, and to support him in a bitter contest against the Canadian Government, some valuable ethnological information is contained in them. The horrible cannibal ceremonies of the Tsimpshian, the inhabitants of Metlakahtla, are described according to Mr. Duncan's statements. The initiation of young men who are to become members of this order takes place as follows: Early in the morning the novices would be out on the beach, or on the rocks, in a state of nudity. Each had a place in front of his own gens. After he had crept about, jerking his head and screaming for some time, a party of men would rush out, and, surrounding him, would begin singing. There are three orders among the Tsimpshian and their neighbors, — the cannibals, the dog-eaters, and the dancers. The dog-eating order occasionally carried a dead dog to their novice, who forthwith began to tear it in the most dog-like manner. The party of attendants kept up a low, growling noise, or a whoop, which was seconded by a screeching noise made by means of an instrument which they believe to be the abode (or voice?) of a spirit. In a little time the naked youth would start up again, and

proceed a few yards in a crouching posture, with his arm pushed out behind him, and tossing his flowing black hair. All the while he is earnestly watched by the groups around him; and when he pleases to sit down, they again surround him and begin singing. This kind of performance goes on, with several little additions, for some time. Before the novice finally retires, he takes a run into every house belonging to his gens, and is followed by his train. When this is done, in some cases he has a ramble on the tops of the same houses, during which he is anxiously watched by his attendants, as if they expected his flight. After a while he comes down, and they then follow him to his den, which is signified by a rope made of red-cedar bark being hung over the doorway, so as to prevent any person from ignorantly intruding into its precincts. Another remarkable performance noticed by Duncan is the following: At low tide an illuminated disk with the figure of a man upon it was lit up at the water's edge. It represented the moon, and the Indians suppose that the shamans are there holding converse with the man in the moon. Metlakahtla is at the present time a thriving village, with a saw-mill and canneries. It was founded in 1862 by a party of Christian Indians, who were converted by Mr. Duncan, and emigrated with him from Fort Simpson. In course of time disagreements arose between Mr. Duncan and the Church Missionary Society, to which he belonged. In behalf of his Indians, and for developing the resources of his village, it was Duncan's policy to keep new settlers out of the northern coast of British Columbia, and his influence helped greatly to suppress the disastrous whiskey trade. But, as the white population on the coast was increasing, his policy proved detrimental to the interests of the new settlers, as Duncan had practically attained a ruling power over the whole country, from the boundary of Alaska to Vancouver Island. This was the first reason for his disagreement with the Church Missionary Society and with the Canadian Government. The outcome of these disputes is the resolution of the Metlakahtlans to emigrate to Alaska.

#### BOOK-REVIEWS.

*Die Culturvölker Alt-Amerika's.* By DR. GUSTAV BRUEHL. Cincinnati, Benziger Bros. 8°.

DR. GUSTAV BRUEHL'S recent work on the civilized nations of ancient America is of great interest, as it is a comprehensive review of the culture of the Mexicans, Maya, Chibcha, and Peruvians from the point of view first expressed and developed by Morgan and Bandelier. While the Spanish chroniclers considered the constitution of these states as similar to those of Europe, Brühl endeavors to show, by an enormous mass of testimony compiled from all available sources, that there were no despots and no feudal institutions, but that the gens was the sole basis of the social organization of all American nations, even in the highest state of their civilization. The first part of the work was printed as early as 1875; but while it was in progress the views of the author were so much modified, and the amount of new material added by his own excavations and researches in Central America and furnished by other writers on this subject grew to be so large, that the publication was delayed for twelve years. The first part of the book deals with the ruins of the Mississippi valley, of Mexico, Chiapas and Yucatan, Central America, Colombia, and ancient Peru, and with those in the region of the Rio Colorado and Rio Grande. As it was printed in 1875, some of the statements made at this place must be modified; but nevertheless it is an extremely valuable handbook on this subject, on account of the clearness of the arrangement, and the care the author has taken in giving the sources of his information. A review of the methods of writing and of the calendar concludes the first part.

The second part is far more important, as here the author uses his extensive knowledge of the subject for proving the theory that the division into gentes was the foundation of the states of all American nations. He discusses the separate centres of civilization, and expresses his view that the heroes who first brought civilization to the rude tribes became their deities. He discusses the distribution of property, particularly that of land, the plan of the towns and houses, the giving of names, the religious worship, and finds his views confirmed in all these phenomena. Therefore the chapter on the social organization is by far the most important one



of the book. Though hardly any explicit statements of the division of these nations into gentes is given by the ancient authors, numerous remarks indicate that these divisions existed. Each gens had its own chief, and owned a certain tract of land. In case of war, the whole army was divided according to gentes, each gens being commanded by its own chief. A further proof for this theory is found in the laws of inheritance and marriage, and in the terms of relationship. Every gens had even its own deities, temples, worship, and its separate myths. Brühl considers the great states of Mexico and Central and South America as confederations of tribes who subjected other neighboring tribes, whom they compelled to pay a tribute. Nowhere were states formed by uniform nations.

*Die Erde in Karten und Bildern.* Vienna, Hartleben. 4°.

THE publication under review is an atlas, accompanied by text and numerous illustrations. It belongs to a class of publications which unfortunately is still entirely wanting in America. Our atlases are expensive, gorgeously colored, and generally not well drawn, while there are a number of European atlases which are sold at a moderate price, the drawing of which meets all reasonable expectations, and which are tastefully colored. The present atlas belongs to this class, but its characteristic feature is the accompanying text. The illustrations are carefully compiled from works of travel, and represent characteristic views, animals, plants, and ethnological objects, and may be used to advantage in schools, as they convey a good idea of geographical phenomena to the reader. The text, so far as we can judge from the numbers that have reached us, is not intended to be of a scientific character, but it is a popular treatise on geography. First, physical geography is treated. This will be followed by a special part on the geography of the separate continents and countries, and the last part will treat of commercial geography. The maps are well drawn, and the lettering and the topography are clear. The physical features are distinct, as the maps are not crowded with names. This atlas shows how far German cartography is advanced as compared to our own. There is no American atlas that can compare to this cheap publication, or to the well-known 'Handatlas' by Andree. Even the large and costly maps which are published in our country do not meet the wants of geographers so well as the German publications. But there is little demand for good maps so far. So long as our teachers are content with the low class of text-books and maps which are used in most schools, publishers will be reluctant to attempt the publication of costly works of this kind: but as soon as there is a demand, good maps and good atlases will be forthcoming; for there is no absolute want of cartographers, as the publications of our government, particularly those of the Coast and Geological Surveys, show.

*Comparative Morphology and Biology of the Fungi, Mycetozoa, and Bacteria.* By A. DE BARY. Tr. by HENRY E. F. GARNSEY, and revised by ISAAC BAYLEY BALFOUR. Oxford: Clarendon Pr. 8°.

ONE sometimes feels that English translations of German works above the grade of comparatively elementary treatises are unnecessary, since all persons qualified to understand the subject are presumed to be able to read the original. The present translation, however, shows that this feeling is erroneous. The original work of De Bary appeared in 1884. We say original, because, although, in one sense, the work of 1884 is a second edition of the second volume of Hofmeister's 'Handbuch der physiologischen Botanik,' published in 1886, the treatment is so different, and our knowledge of the subject has widened so rapidly within the last twenty years, that there is not much resemblance between the two editions. The work of De Bary is so well and favorably known, that we need not speak at length of its merits. In the chapters on *Mycetozoa* the author includes *Myxomycetes*, *Acrasie*, and some doubtful forms, but excludes many amœboid forms classed by Zopf among the *Schleimpilze*. The chapters on bacteria have been to some extent replaced by the more recent 'Vorlesungen über Bacterien,' by the same author. The original, it must be admitted, is rather hard reading for foreigners, in spite of its clear scientific treatment of the subject; and all English-speaking botanists will be glad to welcome the present excellent translation, which, while preserving the sense

and spirit of the original, presents it in a form which can be much more quickly and easily absorbed, even by those who have a good knowledge of German, and are acquainted with the subject treated. American botanists will now be able to read the admirable treatise of De Bary with ease as well as with profit.

*A Course of Practical Instruction in Botany.* By F. O. BOWER and SYDNEY H. VINES. Part II. Bryophyta and Thallophyta. New York, Macmillan. 8°.

THE second part of the practical botany by Bower and Vines is similar in form to the first part, which appeared in 1885, and is intended to be a guide to the student who is studying botany by the type methods. The common *Polytrichum* and *Marchantia* are used as illustrations of mosses and *Hepaticæ*; but the bulk of the work is devoted to *Thallophytes*,—a group which does not lend itself to popular treatment in a short space, for the types of reproduction are numerous, and the illustrations must be taken largely from plants which have no common names, in this country at least. The present volume is a valuable aid in the laboratory where the instructor prepares and selects the material, but it is not adapted to those who are obliged to pursue their studies independently of competent instructors. For the latter class of students, the chapters on *Thallophytes* are, as a rule, too condensed, and the absence of plates necessarily makes the text a little obscure for beginners.

*The Making of the Great West.* By SAMUEL ADAMS DRAKE. New York, Scribner. 12°.

THIS is a thoroughly commendable volume. It is constructed on the same general plan as 'The Making of New England,' by the same author, though dealing with a far larger and more complex subject.

It is too often the case that brief histories of the United States are written so entirely from an Atlantic coast standpoint that the great territory west of the Mississippi receives scant treatment at the authors' hands. Mr. Drake's plan of treating the various sections separately avoids this lack of proportion, and affords an opportunity of bringing the important facts in the history of each section into the prominence which properly belongs to them. In this volume the author makes three subdivisions. In the first we find a lucid and well-illustrated account of the planting of the Spanish, French, and English civilizations on this continent. In the second the territory acquired by the Louisiana purchase is treated, and then follows the story of the advance of civilization in the West up to the time that gold was discovered in California. The third section completes the story from 1848. Mr. Drake's conception of history is that of the late John Richard Green, and his narrative is accompanied with excellent sketches of the aboriginal and conquering civilizations. For that reason, as well as because of its pleasant style, 'The Making of the Great West' would be a valuable reading-book for grammar and high-school use.

*Three Good Giants, whose Famous Deeds are recorded in the Ancient Chronicles of François Rabelais.* Compiled from the French by JOHN DIMITRY. Boston, Ticknor. 12°.

IN this volume the works of the old French humorist are presented in an expurgated form, and profusely illustrated by Gustave Doré and A. Robida. The result is a book for children; but what its value in that respect may be, can only be determined by experience. There is certainly not much in it that is interesting to grown-up people, the humor of it being so extravagant that it often ceases to be humor. Children's tastes, however, are different, and with them the book may become a favorite. Such attempts to preserve what is best in old writers are in themselves praiseworthy; for the world is not so rich in good literature that it can afford to part with any of it. The illustrations, which are of the same fantastic type as the story itself, will add to the attractiveness of the book.

*A Collection of Letters of Thackeray.* New York, Scribner. 8°.

THE series of letters from Thackeray to Mr. and Mrs. Brookfield, which were lately published in *Scribner's Magazine*, are here offered in book form. They were written between the years 1847 and 1855, after the death of Mrs. Thackeray, and when their author was in the full flush of early fame. They show him in various moods, the humorous predominating, of course, yet oftentimes with

an undertone of melancholy which enhances their interest. That he enjoyed his fame at first, and the social entertainments it brought him, is manifest; and yet in one of the latest letters of the series, written from Philadelphia, he declares that he doesn't care any more for praise, or for abuse, or for reputation of a literary sort. For the rest, the letters reveal the same qualities of mind and character that his novels exhibit, with perhaps a little more tenderness as he unbosoms himself to his friends. There is the same smooth and brilliant style, the same satirical wit and badinage, the same keen eye for the superficial elements of life, and, it must be added, the same apparent inability to see any thing deeper. Only once or twice, as on pp. 35 and 95, does he strike a deeper vein; and one cannot help wondering whether he did not care for such things, or whether he did not venture to say what he thought about them. The letters are certainly very interesting, and will doubtless long continue to be favorites with readers of English literature.

#### NOTES AND NEWS.

THIS year is remarkable for the number of accidents in the Swiss Alps. It is stated by a Swiss newspaper that the season's death-roll is an unusually heavy one. In the short space of not quite a month twenty-two tourists met with accidents, of whom eighteen were killed. The accident on the Jungfrau (canton of Bern) involved the loss of six lives; that on the Falkniss (Granbündten), three. One life was lost in each case in the accidents on the Morteratsch glacier (Granbündten), Molesa (Waadt), Gantrist (Bern), Leissigergrat (Bern), Säutis (Appenzell), Kaisereck (Freiburg), Dent de Corjan (Waadt), Schächenthal (Uri), and Diablerets (Wallis). There were no guides among the eighteen killed, and only too many persons make ascents without guides. The four injured persons were all tourists.

—Although automatic telegraphy has long been known, says the *London Times*, it has not, so far as we are aware, proved a commercial success, owing to the circumstance that the instruments used in conducting it are expensive, the system slow, and the synchronism unreliable. In this system the messages are first written with insulating ink on tinned paper, and fed into instruments whereby they are transmitted. At the other end they are received on chemically prepared paper, but the messages soon fade. A very pronounced improvement upon this system was made by Mr. E. A. Cowper, C.E., some few years since, in his writing-telegraph. Here the movement of a pen at the sending-station introduced varying resistances into two electric circuits connected with the receiving-station. The varying currents acted upon two electro-magnets at the latter station, and caused them to impart movements in two directions at an angle to each other to a receiving-pen, which was made to reproduce the writing formed by the sending-pen. Mr. Cowper, however, was not alone in his invention of the writing-telegraph, for, as not unfrequently happens, another diligent worker was busy in the same direction and at the same time. This was Mr. J. Hart Robertson, an American electrician, who, without being aware of Mr. Cowper's invention, produced an instrument upon the same plan. He found, however, that it involved heavy expense in operating, and, pushing his research further, he in course of time produced an improved instrument. This is the writing-telegraph which we recently saw in successful operation in the American Exhibition. The principle involved consists in changing the strength of the electric currents by the movements of the pen when writing, varying the pressure on a series of carbon disks included in the circuits. By this means simplicity, greater speed, and the utmost accuracy in reproduction, are secured. In this apparatus the transmitter consists of two series of carbon disks placed at right angles to each other in a hard-rubber receptacle. Each pile of disks has a screw follower for adjusting the normal pressure of the disks on each other. A rod carrying the pen or stylus is pivoted at its lower end, and has pressure-points opposite the piles of disks. The operator manipulates the stylus or pen as in writing, although he can only move the point of the stylus over a small circumscribed area. As the stylus describes the various letters, the pressure-points are pressed against the carbon disks; and as this pressure is increased or diminished, varied currents are sent into the lines to the receiving-magnets, which cause the receiving-pen to reproduce every

movement of the pen of the writer at the transmitting-station. The receiving-instrument consists of two electro-magnets set at right angles to each other. At the point where the poles would reach if extended is a rod for carrying the armatures. Near where the rod is pivoted at the bottom a spring wire is inserted, so that its armatures can easily and quickly respond to the varying attraction of the electro-magnets. The armature rod extends above the table, and carries the recording-pen. Each machine is both a sender and a receiver, and the working of the system is most simple. The operator at the sending-station uses the stylus as a pen to form imaginary letters, words, and sentences: in short, to write. He sees the writing produced by the recording-pen in ink on a slip of ordinary paper ribbon which slowly passes before his eyes. At the receiving-end the operator sees precisely the same thing going on, for the written message is being reproduced by the little pen, line for line, in perfect facsimile, on a slip of paper passing before him. We thus have a really beautiful system of written messages, and one which is already working commercially in the United States, where it is taking the place of the telephone with marked success. Instead of the repeated shouting and comparative publicity of the telephone, the message is written by the sender and the visible answer received in perfect quiet. But should the surroundings be noisy, it matters not, for the little pen silently writes away regardless of noise of any kind. The writing at both ends has all the characteristics of the writing of the sender, and the message constitutes a record which cannot be disputed, and is therefore invaluable to business-men. There is a facsimile record at each end, and neither of them can be altered without detection. The invention is at once ingenious and practical, and is the completed expression of the long-cherished desire to produce a writing-telegraph.

—On a part of Sir Joseph Banks's Museum, at the back of 22 Soho Square, being pulled down, in a recess with doors which had not been opened for about half a century, a very interesting collection of relics of Captain Cook's voyages in the South Seas has been discovered. Inside the panelling the following inscription was written in the handwriting of Sir Joseph Banks, who accompanied Captain Cook on his travels: "Instruments used, carvings, weapons, and heads, collected by Captain Cook during the voyage of the 'Endeavour.'—J. BANKS." These relics have been bought by Sir Saul Samuel, the agent-general for New South Wales, and will shortly be despatched by him to Sydney for the State House Museum at that place. Among the collection are the following interesting articles: old quadrants and other instruments used by Captain Cook on board the 'Endeavour,' four of which are in oak cases; two mummied tattooed heads of New Zealand chiefs; two native models of New Zealand canoes, one carved; two large carved canoe-paddles; carved spears and war-clubs; a native chief's paddle, beautifully worked with idolatrous carving; a very fine stone hatchet with handle, and upon it the following inscription in the handwriting of Sir Joseph Banks, "Brought to England in 1775 by Captain Cook from Otaheite;" and a wooden bowl with lip, used for handing round human blood in the days of cannibalism. There is also a carved wooden sceptre with the following words scratched on it, presumably by Captain Cook: "Made for me by Wanga.—J. C." Sir Joseph Banks's handwriting can be identified.

—As a result of his experiments on the maxillary palpi of mandibulate insects, myriapods and female spiders, Plateau comes to the conclusion that in the arthropods they subserve no functional purpose whatever, and are to be looked on as organs which have become useless, like the mammae of male mammals. Plateau also discovers by experiment that not the slightest trace exists of any visible external respiratory movements in arachnids, such as Blanchard describes, or in chilopod *Myriapoda*, and suggests that the action must be wholly intrapulmonary, supporting himself partly by some observations of MacLeod, who thought he had discovered evidences of muscular tissue between the pulmonary lamellae. Locy, however, was unable to discover signs of it in the young.

—Dr. Mercier is about to publish, as an introduction to the scientific study of insanity, a work on the nervous system and the mind. It will contain an exposition of the new neurology as founded by Herbert Spencer and developed by Hughlings Jackson; an account of the constitution of mind from the evolutionary stand-



point, showing the ways in which it is liable to be disordered; and a statement of the connection between nervous functions and mental processes as thus regarded.

— Captain Armstrong of the British steamship 'Alps' reports to the New York branch Hydrographic Office, Sept. 29, 1887, as follows: 7 A.M., Sept. 23, 1887, off the south coast of Cuba (latitude  $19^{\circ} 44'$  north, longitude  $74^{\circ} 24'$  west), Cape Guanós bearing N. N. E., distant about 22 miles, felt the shock of a submarine earthquake, lasting about 45 seconds, causing the ship to vibrate fore and aft. At first it appeared as if the valves were thrown open to give an extra shake-up on the engine. 7 miles farther N. E. by N. felt another milder shock, lasting about 7 seconds. 8.10 A. M., about 13 miles from the first disturbance, felt three shocks, lasting about two-thirds of a second, at intervals of about a second. At 8.45 A.M. felt another mild shock, lasting about 2 seconds. The sea was quite smooth, and had been smooth during the night. When the first shock was felt, the sea appeared to rise higher in a solid body (without the least break) for about 3 seconds, and continued smooth after. Light variable winds prevailed, with calms at intervals. Barometer, 30.05; air, 79; water, 84; midnight, barometer, 29.95. The high land of Cuba was enveloped in dark lead-colored clouds, sky from N. E. by E. to S. was quite clear, and several water-spouts were visible in a N. N. E. direction. Noon, after passing Cape Maysi, the weather was clear and fine. By the charts I should think the disturbance occurred in more than one thousand fathoms of water. (Civil time.)

— A correspondent of *Nature* seeks the opinion of psychologists on the following circumstance: A female child, quick and intelligent, when about fifteen months old, learned to repeat the alphabet, shortly afterwards the numerals, days of the week, month, etc., and subsequently scraps of nursery rhymes, English and German, then to spell words of two and three letters. All this was learned readily, eagerly indeed, and for a time she remembered apparently every word acquired, indelibly. At about two years old, further teaching was for a time remitted, as she was observed to be repeating audibly in her sleep what she had learned during the day. Subsequently, tuition was resumed under a governess; but she had not only forgotten much of what she had previously known perfectly, but learns far less readily than formerly. She is now about three and a half years old, in perfect good health and spirits, quick, and particularly observant, but the capacity for learning by rote is materially diminished. She is remarkably imitative, but shows no faculty whatever for writing, and as little for music. The writer would like to hear of any parallel cases, and what the ultimate development has been, with any opinions upon the cause of their appearances.

— At the central station of the United States Fish Commission in Washington may be seen a carload of young trout from Wytheville, Va., for distribution in Maryland, Virginia, and places adjacent to Washington. The collection comprises California trout, lake trout, brook trout, and rock bass. Some handsome specimens of grayling, artificially propagated, are also shown. The young trout have all been hatched artificially and reared at Wytheville. The commission keeps them until they attain a growth of several inches, and then distributes them. A supply of trout will be sent to any person who has on his place suitable waters, and facilities to insure proper protection for the fish. A dozen young trout are sufficient to stock an ordinary pond or lake, and one hundred to stock a running stream. The fish should not be molested for at least three years, until they have had an opportunity to spawn twice. The commission will send a carload of young carp and other fish to the Kansas City Exposition in a few days. The car will remain there a few days, affording opportunity to visitors to the exposition to inspect the methods of fish-distribution. Some of the young carp will be distributed from that point, and the car will then proceed on a trip, for distribution purposes, to the South-west. It is proposed to use one of the breeding-ponds in Washington next year for raising shad. Colonel MacDonald says that a million shad could be raised to such a size, in one of these ponds, as to insure the return to the Potomac of at least two hundred and fifty thousand shad of full growth. The young shad will then be turned out into the Potomac.

— The opening address of Col. Sir Charles Warren, president of the Geographical Section of the British Association for the Advancement of Science, deals with the much-discussed subject of the teaching of geography. The views expressed in this address are of interest, as the author opposes the new methods advocated by the Royal Geographical Society, and declares that they will lead to evil results. "It seems now to be desired to promote the acquirement of knowledge at the earliest age without effort and without hard work; but this appears to be directed towards alleviating the toils of the instructor as much as the instructed; and we have now, as a result, children taught common things without any effort to strengthen their memories, and then a system of cramming introduced at a later period, when the memory has ceased to be capable of responding to the efforts made. . . . It seems to me that the remedy recently adopted is worse than the disease it was to eradicate, and that, however injurious it was to attempt to store the mind with mere names, yet the memory was trained thereby to retain something definite; and it is still worse to attempt to store the mind with mere ideas without the connection of names, and leave the memory to rust. There is obviously a middle course which may rid us of the errors of the past without leading us into still greater difficulties; and if we keep the object to be gained always in view, we cannot fail to take a direct line. We want first to lead the memory to constant exertion of such nature that it grows stronger day by day, but is not overstrained or wearied; at the same time it must be stored with useful facts, which may be quite above the capacity of the mind to comprehend at the time, but which will be required all through life: this can readily be done by means of verses or rhymes set to simple airs and committed to memory by song." As these views are expressed from so prominent a place, they require some comment. In another passage of his address, Colonel Warren says, that, in consequence of the progress of science, we are fast losing our human nature, and are becoming machines, and we call it becoming civilized; that we are drifting into a condition in which we learn nothing of ourselves or by our own individual efforts. This is exactly what educationists complain about, and the reason why they demand a method of teaching which develops the mental powers. But this aim will not be reached by memorizing rhymes containing uncomprehended and incomprehensible facts. It is a misinterpretation of the method recently advocated by geographers, if Warren says that it is only directed to alleviate the toils of the teacher and of the pupil. It requires much careful preparation on the part of the teacher to represent facts to the untrained mind of a child so that they will be intelligible, and it requires the utmost exertion of the attention, memory, and the faculties of observation of the child, to meet the demands of the teacher. The remarks of Colonel Warren on the desirability of an efficient teaching of geography will be generally accepted, but there is not much difference between the memorizing which is still practised in most schools and the methods he proposes.

#### LETTERS TO THE EDITOR.

\*.\* *The attention of scientific men is called to the advantages of the correspondence columns of SCIENCE for placing promptly on record brief preliminary notices of their investigations. Twenty copies of the number containing his communication will be furnished free to any correspondent on request.*

*The editor will be glad to publish any queries consonant with the character of the journal.*

*Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

#### Over-Pressure in the Schools.

WHEN we ask whether over-pressure in the schools is a fact, we receive answers ranging all the way from the most positive affirmatives to the most positive negatives. In fact, it is one of the 'burning' educational questions of the times. There now lie before me two paragraphs cut from the same number of an educational journal, that speak the two voices. In one, Dr. W. A. Hammond of New York tells the story of a little girl brought to him from school affected with St. Vitus's-dance, in whose book-bag were an English grammar, an arithmetic, a geography, a history of the United States, an astronomy, a physiology, a French reader, a French grammar, and a treatise on general science. The doctor says the little girl had learned all these things, but had done so at the expense of her brain capital, not of her brain income. Intellectual bank-

ruptcy was staring her in the face. He appears to think that this is a typical case, and concludes that we are living too much under the rule of the school-master. The other voice is spoken by Miss Mary E. Yate, principal of one of the New York schools. She has never heard of a child that was injured by the school system. Other causes hurt young people: the dissipations of child-life kills tens of thousands where study kills one. Too much candy, late parties, church sociables, story-reading at night, etc., are the real causes of ills attributed to over-study. Now, where does the truth lie?

First, if the little girls of the country are swinging to and from school book-bags filled as Dr. Hammond says he found one filled, teachers cannot plead social dissipation and candy as the cause of their failing health. If this is a typical book-bag, then the course of study is overcrowded, and too much work is demanded by the schools. But this is not a typical book-bag, and we may set it aside in seeking an answer to our general questions. No doubt such book-bags can be found; no doubt there is great over-pressure in some towns and cities; perhaps the average course is too full: but the little girls of the country are not carrying on at one time all the studies represented in that fateful book-bag.

Second, as a class, the physicians of the country are disposed to take the ground taken by Dr. Hammond: as a class, the teachers of the country tend to side with Miss Yate. Such are the two opposite tendencies, and I do not for the moment attempt to decide between them. But it is important to observe that the physician and the teacher alike are each pretty sure to exclude certain important elements from the problem. The physician, seeing that the school is a very prominent, perhaps the most prominent, factor in a child's life, is apt to charge to the school ills that spring from some other cause, or that spring from the school together with other causes; while the teacher, disposed to magnify his office, and to think that school-education should be the main pursuit of childhood and youth, is apt to overlook other demands, and necessary demands, that are made upon the child's time and energy. The result is, that neither the doctor nor the teacher deals with a whole child; the two divide the child between them: whereas the doctor and the teacher should each treat the child as a whole or unit, — body and mind, home and school, work and play, — and deal with him accordingly. There are teachers who need to be reminded that they cannot absorb, and ought not to absorb, a child's time and life over and above sleeping, eating, and dressing. There are many necessary child activities that fall outside the school, although wise parents will see that these are kept within due limits. The school-master is certainly abroad, and in a sense perhaps too much abroad.

Passing to the main question, over-pressure in the schools is a fact to the same degree that over-pressure in other departments of American life is a fact. Here I see no reason to throw aside or modify the conclusion that I came to three or four years ago, of which this is the substance. Our inherited Saxon push, our national environment, our boundless opportunities, and our free institutions, in respect to courage, audacity, enterprise, and many forms of achievement, make us a people by ourselves. It would be hard to name a field of life in which our energy, impatience, and nervousness do not show themselves. It is notorious that the average American does more work, whether physical or mental, than any other average man in the world: hence it is that America is the gauge for measuring the most energetic communities of the Old World; as when Lancashire, England, is called 'America and water.' The words in which Mr. Herbert Spencer spoke of the injury done by our high-pressure life, at the dinner given him in New York four or five years ago, will not soon be forgotten. History has charged a good deal to the American spirit, and credited it with much more. Its worst effects, unfortunately, are seen in the higher fields of effort, — science, literature, education, and art, — where time is an all-important factor. The tension of the public schools is too high in the sense that the tension of our business and social life is too high: in other words, the schools partake of the national genius. Dr. Stanley Hall, some years ago, said he had seen a file of one hundred and fifty small German boys just as they marched out of the school-house at noon a quarter of a mile away; also that he had observed that the little girls at the Victoria school, Berlin, did not run a step at recess, or do any thing that an equal

number of ladies might not do. But such things as these, it hardly need be said, cannot be found in the typical American school.

The foregoing remarks have been made with almost sole reference to our public-school education considered as a whole; but they can be extended with hardly a word of qualification to our higher education, professional education, and technical education considered in the same way. While we have much in these departments of which we may well be proud, we also have much that we must excuse or altogether abandon without defence. The causes of this state of things are the restlessness and impatience of the national character: its conditions are the external facts of American life, and particularly in those communities that are less than one hundred years old. Nothing but more maturity and the established ways of an older and more orderly society, where constant forces work with more steadiness, and chance plays a less part than hitherto in success, can remedy these evils.

My answer to the question whether over-pressure in the schools is a fact, is broad and general, taking no account of a considerable number of facts that are at variance with it, and that of themselves would refute it. For example: I can name a city where the principle of emulation is greatly overstrained; the scholars of a particular class, the classes of a particular building, and all the buildings of the city, are engaged in an unending competition for 'marks;' the teachers cram the children with lessons, and the newspapers cram the people with tables of percentages; and the public seem rather to enjoy it. Such facts as these are very important in their way, but do not call for a modification of the judgment presented above. They prove that school tension is sometimes in excess of the amount found in common life.

From the premises now presented, some important conclusions follow. Speaking broadly, as before, the teachers of the public schools are not responsible for such over-pressure as exists. They show the traits of the national character; they magnify their office; they are open to severe censure in numerous individual cases; but their courses of study and their methods of instruction, they have invented to meet the popular demand. To be sure, the impression is common that teachers go counter to the wishes of parents when they hurry children through school; but the fact is, the average teacher is not so anxious to hurry the child as the average parent is to have him hurried. This proposition cannot be proved by statistics, but it will be indorsed by the sensible school superintendents of the country. The rank of their children in the classification, their position in the school, their promotion from grade to grade, — these are with numerous school-patrons a passion.

Another conclusion is, that the evils which exist cannot, for the most part, be remedied by reading school-teachers sharp lectures. The fundamental trouble is with the public; and it is simply the educational outcropping of the national genius, push, hurry, impatience. Of course, the wrong-doing of particular teachers can be corrected by criticism, or the faults of a system of city schools may be remedied by discussion; but the over-tension of the schools of the country can be fully relieved only by a toning-down of the national life, and this must come about mainly of itself. So far as discussion is concerned, the most important thing that can be done is this: to impress the public with the facts that time is an all-important element in education, and that knowledge, and, still more, mental faculties, grow, and are not made. Pressure can never take the place of time. Warmth is essential to the maturing of the peach, but the fruit-grower will not promote the process by building a fire on the roots of the tree. It is very desirable to get some of the present self-consciousness out of the lives of young children. And then, how desirable it is that boys and girls go to the high school with a full year more of life and strength behind them!

Finally, perhaps the most serious and common fault of teachers is the tendency to fuss and worry. Teachers worry more children to death than they work to death. Fretting, an excess of 'order,' an overdoing of 'position,' do more harm than books and lessons. The topic runs into moral training where we cannot follow it. But sound digestion, strong nerves, a good appetite, sleep, that "knits up the ravelled sleeve of care," good temper, self-command, cheerful confidence, and a young spirit, are important elements in moral

training; what is more, they are not properly appreciated. Not one man in a thousand knows the amount of harm that is done to young children by placing them under the tuition of testy, irritable, explosive, and neurotic teachers.

B. A. HINSDALE.

Cleveland, O., Oct. 3.

### Objects in Teaching.

THE value of objects in giving correct ideas, was brought forcibly to my mind not long since while teaching a class in natural philosophy at the New York State Institution for the Blind, Batavia, N.Y.

It was my custom to place before them, the day before its uses and the principles which it illustrated were to be discussed, a given piece of apparatus, that, by becoming familiar with the form and construction, its application might the more readily be appreciated. One of the class, a young man blind from infancy, with a fondness for machinery of all kinds and a quick perception of the use of such as was placed before him, would frequently study the lesson in advance, picturing to himself as carefully as possible the apparatus described. These pictures, as he told me afterwards, were far from correct.

The thorough examination and understanding of each succeeding object, of whatever kind, add so much to the stock of correct concepts, which is valuable not only for itself, but for its aid by comparison in understanding others.

One of our most successful teachers described to her class, ranging in age from eight to twelve, as vividly as she could without naming it, a ladder. Among other things, she stated that it was made of wood, had parallel sides, etc., using such terms as would seem to be most readily understood, and then asked for the name of the thing described. For some time no one could tell: various things were mentioned, one boy suggesting 'map,' the maps for the blind being cut in relief from wood, with the sides of the frame parallel.

A little girl had for the first time a bird, a stuffed specimen, placed in her hands, and was much surprised to find that it had but two legs, having supposed until then that birds had four.

Whatever may be said for or against object-teaching for seeing children, that of blind children is successful proportionately as it is objective.

J. T. MOREY.

Perkins Institution, South Boston, Mass., Oct. 3.

### Color-Blindness.

IN the opening article in *Science* last week (Sept. 30) an idea was suggested, or recalled, that may be of value; and I offer it in view of the possible value. I have observed for twenty years or more a difference in the power of my two eyes, at times, to discriminate in light reds when viewed at a distance of fifty feet or more; and I think this difference in the visual power of the two organs depends very largely, if not altogether, on the way in which the eyes are used. If I have been occupied with work that called one eye into active exercise, where the mind was occupied in discussing the surface or object viewed, particularly if the light was variable, then I find persons appear different, according to which eye is used. Not only so, but the two eyes do not focus the same; the image, with the tired eye, being farther off than that from the eye that is rested, and of a dull gray color. If I go to a lecture under such circumstances, there appear to be two lecturers, — one pale and shadowy behind; and above, the other, which seems, perhaps by contrast, to take on a brighter hue. Under such circumstances, I close the tired eye, — as I have come to consider it, — and give it a rest, or go out into the fields and give it a feast on green. Now, may not the eyes of engineers vary as to visual power in the discrimination of colors with excessive use? If both eyes are exhausted and need rest, the individual would not be able to detect his own disability. Now, if that is so, it is of importance to the public that no one should be on duty for a great length of time, where the safety of any depend on the discriminating power of the eyes as to colors.

And would it not be well, in testing eyes, to note the condition of the individual, — whether fresh or tired, just from work or just from rest?

GEO. F. WATERS.

Boston, Oct. 3.

### Percentage of Ash in Human Bones of Different Ages.

REFERRING to Watt's 'Dictionary of Chemistry,' under the article 'Bone,' we find two tables of analyses of bones, — one by Von Bibra, and the other by Frémy. These two scientists do not arrive at the same conclusion. Von Bibra states that "the portion of inorganic matter in bone is smaller in youth than in age, although no regular gradation can be observed;" while Frémy holds that "the bone of a foetus was found to yield the same quantity of ash as that of a woman of ninety-seven years of age." Although the actual number of analyses made by these investigators was large, yet simple inspection of their tables will show that very few were made of the same bone in each case; and it is evident that a comparison between a femur on the one hand, and a tibia on the other, could not be trustworthy.

It occurred to me as worth while to supplement their lists; and I here present what may be considered a report of progress in that direction, very much yet remaining to be done.

The extreme difficulty of getting supplied with material the history of which is both certain and satisfactory renders the work exceedingly slow.

The bone for examination was in every instance cut from the dense portion of the shaft of the femur. No subject was taken who had, so far as known, suffered from rickets or other serious bone-disease, and women of recent confinement were also excluded. All specimens were obtained either from living persons (amputations) or those recently dead. After crushing in a steel mortar, extracting with ether, and again crushing, the ash was determined by incineration in a platinum dish. The results are in the appended table.

No.	Sex.	Color.	Nationality.	Occupation.	Died of.	Age in years.	Per Cent of Ash.	Remarks.
1	Specimen	White	lost.		Phthisis	65	67.05	
2	Male	White	"	"	"	21	65.89	Had scrofula
3	"	Negro	"	"	"	23	67.28	Had syphilis
4	"	White	Russian	Sailor	"	33	67.63	Amputation
5	"	"	American	Farmer	"	23	67.66	
6	Female	"	Irish	Actress	Peritonitis	60	67.55	
7	Male	"	"	"	Phthisis	24	68.29	
8	Female	"	Irish	"	"	57	67.73	
9	Male	"	"	"	"	58	67.60	
10	"	"	"	"	"	57	68.82	[bowel-disease
11	Female	Negro	"	"	"	25	68.20	Died of some
12	Male	White	Irish	Laborer	Killed	21	67.73	
13	"	"	English	Brewer	"	31	66.51	Amputation
14	"	"	Irish	"	"	8	64.86	"
15	Female	"	"	Domestic	Phthisis	46	69.67	Married
16	"	"	"	"	Peritonitis	57	67.60	"
17	Male	"	French	"	Old age	81	68.56	"
18	Female	"	American	Farmer	"	60	69.33	Married
19	Male	"	Irish	"	Apoplexy	60	69.33	"
20	Female	"	"	Laborer	Bronchitis	74	68.72	"
21	Female	"	American	"	Phthisis	44	68.30	Married
22	"	"	Irish	"	"	60	67.03	Insane.
23	Male	"	German	"	"	40	69.28	"
24	"	"	"	"	"	53	68.23	"
25	"	"	Irish	"	Phthisis	56	68.94	"
26	"	"	"	"	Bright's disease	41	68.15	"
27	"	"	"	Laborer	Dysentery	48	69.73	"
28	Female	"	American	"	Phthisis	29	69.18	"
29	"	"	"	"	"	34	69.82	"
30	Male	"	Italian	Laborer	Tetanus	29	68.47	Effect of wound
31	Female	"	American	Domestic	Typhus-fever	24	67.99	"
32	Male	"	"	"	Nephritis	49	69.35	"
33	"	"	"	"	Alcoholism	58	68.69	"
34	"	"	Irish	"	"	11	65.87	Amputation
35	"	"	German	"	Phthisis	59	68.93	"
36	Female	"	Irish	"	"	29	69.03	"
37	Male	"	"	"	Pneumonia	55	69.72	"
38	"	Negro	"	"	Phthisis	45	69.06	"
39	"	White	German	Brewer	"	40	69.31	"
40	"	"	English	Tailor	"	73	69.85	"
41	"	"	Irish	Laborer	Killed	38	69.05	"
42	"	"	"	None	Phthisis	25	69.36	Drunkard
43	"	"	American	Hostler	Alcoholism	63	68.07	"
44	"	"	English	Coachman	"	43	65.11	Had syphilis
45	"	"	"	Shoemaker	"	45	65.16	Drunkard
46	"	"	"	Lawyer	Old age	70	62.82	"
47	Female	"	"	Prostitute	Phthisis	26	65.23	"
48	"	"	"	Domestic	"	31	65.61	Bone very brittle
49	Male	"	German	Shoemaker	"	38	63.98	"
50	"	"	Irish	Laborer	"	61	63.54	"

I think enough has been done to show that the common belief in the increased brittleness of bone with advancing years being due to increased percentage of inorganic salts, is without foundation. The appended table indicates that after manhood is reached, no variation in quantity of ash takes place as the years roll on.

"The greater brittleness of the bones in age is attributed by

Frémy to the increase in the proportion of the spongy tissue, the thickness of the hard and dense portion of the bones continually diminishing as age advances."

This has not been my experience. Transverse sections of the entire bone were made in each case, in order to test this very point, by observing the relative size of dense with spongy portion, and I certainly saw nothing to warrant Frémy's conclusion.

At the same time, small columns  $\frac{1}{8} \times \frac{1}{8} \times \frac{3}{4}$  inch were cut from the dense portion of the shaft, and were broken transversely on a testing-machine, in order to determine the amount of brittleness. The most brittle specimen I had (No. 48), showed a rather thicker dense portion than usual.

I find the brittleness to be in the material rather than in the bone as a structure, and, in view of the analytical results, I cannot explain that brittleness, as Von Bibra does, by holding for the gradual increase in mineral salts.

I append a very imperfect table of the results obtained on the testing-machine. Every bone, as I received it, could not be cut so as to give a column of the size required for breaking. It will be noticed, that, in general, strength of bone diminishes as age advances.

BREAKING-WEIGHT FOR COLUMN OF BONE  $\frac{1}{8} \times \frac{1}{8} \times \frac{3}{4}$  INCH, BROKEN TRANSVERSELY.

	Pounds.
25 years of age.....	75
26 " ".....	74
31 " ".....	50
38 " ".....	64
43 " ".....	58
45 " ".....	60
51 " ".....	55
63 " ".....	30
70 " ".....	54

Loss of material by the burning of the laboratory affected, in a measure, the completeness of the work.

WILLIAM P. MASON.

Rensselaer Polytechnic Institute,  
Troy, N.Y., July 21.

#### Evidence of a Glacier-like Movement amongst Snow Particles.

IT has been conclusively proved that glaciers have a movement corresponding in every way, except in amount, with that of water similarly situated. I wish here to point out that snow particles, under certain corresponding conditions, have the same movement but of greater amount.

It appears to me that it would be difficult to draw a line with certainty between those solids whose particles are capable of such movements, and those which are not. I will admit that it were easy to point out this limit for solids that would show sensible movement in limited time; but to do so for solids under unlimited time and large pressure might not be so easy or possible. It seems unlikely that the few solids we have evidence of should be the only ones possessing these movements, particularly when viewed in the light of the fact that so many solids, after being transformed from the molten to their solid condition, exhibit the effects of a movement amongst their particles in longer or shorter periods after their change of condition. It is not, however, with a consideration of this limit that we have to do at present.

In Hudson Strait we had banked around the foundation of our house-walls with moss and rocks, so as to protect ourselves against the weather. This bank had a slope inwards towards the walls from the base. When snow remained permanently on the ground, we made use of it to build up an outside wall, two feet thick and eight high, over this bank, as a further protection against the weather.

Snow, it may be necessary for me to explain, exists, in northern climates, under somewhat different conditions from that in which we are accustomed to see it; so that, very shortly after it has fallen, extreme temperatures and high winds so alter it, that, whilst essentially granular snow, it has become so hard that it requires an iron (not a wooden) shovel to cut it, when, with sufficient care, blocks of unlimited size can be hewn out of it and transported. The particles are now arranged in a high degree of tension; so much so, that, when a block is struck a blow, it gives out a sound such as could be compared with that given out by a brick tile. It was with

snow in this condition that our protecting walls were built. My attention was first called to a movement of the snow by noticing that the snow walls were leaving the building, as I at first supposed, by a 'topping' movement: I therefore built relatively heavy buttresses of snow to retain them, and then found that buttress and wall had partaken of this movement, which was of course lessened, as the buttresses had been built on comparatively level ground. In addition to this, the arches which we had made over the windows out of blocks of snow, of about a foot square and four to five feet long, had, of their own weight, passed from the arch through the straight line into very pendant inverted arches, having left a space on top of the wall between the snow blocks on either side, and become considerably attenuated on account of the increased distance covered, and at the same time remained cemented to the layer next below in the wall. W. A. ASHE.

The Observatory, Quebec, Sept. 26.

#### Grindelia glutinosa in Wisconsin.

THE note in *Science* of Sept. 23, on *Grindelia squarrosa*, reminds me of a curious fact concerning another species of *Grindelia*. Last July I found in the Menomonee valley, near the slaughter-houses west of the city of Milwaukee, a composite plant which I could not find in the list of Wisconsin plants published in the first volume of the 'Geology of Wisconsin.' The plant coincided completely with the description of *Grindelia glutinosa* Dunal in Gray's 'Flora of North America' (*Gamopetalae*, p. 119). I found only one specimen, apparently in perfect health, growing on the Chicago, Milwaukee, and St. Paul Railroad track. Gray states that the species ranges along "the shore of California from Humboldt County and San Francisco to Santa Barbara Islands." The seed of this specimen must have been brought to eastern Wisconsin by one of the many trains which pass through the Menomonee valley to Milwaukee. It is certainly remarkable that two species of a genus not before represented in Illinois and Wisconsin should have migrated so far to the east of their original habitat, and should have both appeared in the same summer in both States.

W. M. WHEELER.

Milwaukee, Sept. 26.

#### Sections of Fossils.

HAVING lately had occasion to consult a paper published by the Geological and Natural History Survey of Canada, entitled 'Contributions to the Micro-Paleontology of the Cambro-Silurian Rocks of Canada,' by Mr. Arthur H. Foord, I wish to call attention to the method there pursued.

Having devoted considerable time to the monticuliporoid corals of the Cincinnati group, I have come to the conclusion that magnified views of the internal structure of these fossils are of little use in the determination of species. The paper in question deals entirely with these internal features. Several plates are given in illustration of new species, and, out of 67 figures of 12 species, 23 are of natural size. Many of these are very poor, and would be of little value in the determination of species. And as now more stress is laid upon the figure than the description, it follows that some of the species would be unrecognizable from either the one or the other. Thin sections to show the interior cannot be made without considerable skill, much labor, and time; and I think I am prepared to show, in a paper now in press, that even when made the features they show under the microscope are of no value whatever as specific characters.

JOSEPH F. JAMES.

Miami University, Oxford, O., Sept. 27.

#### American Caves.

IN the October *Scribner*, Professor Shaler states that the reason caves were not used as much in North America as in Europe, was, "the first peoples of this country had already attained an advancement in the arts which enabled them to make shelters," etc. This is not true. The first peoples of America were as rude as any in other continents; and the typical cave-dwellers of Europe were not any more primitive than Eskimos of recent date. It is much to be regretted that so erroneous an idea of ancient man in America should be set forth in a popular magazine. CHAS. C. ABBOTT.

Trenton, N.J., Oct. 1.